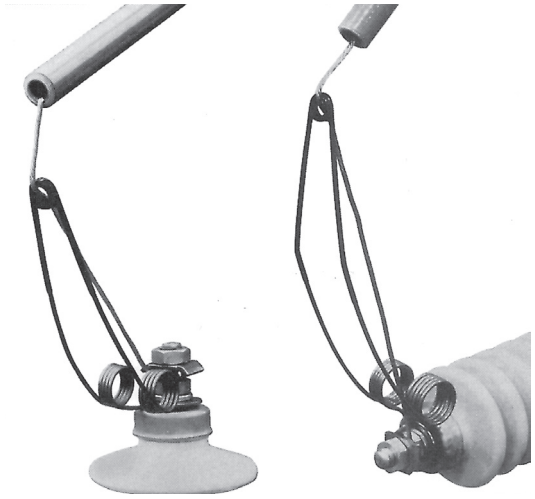
Power Capacitors
Catalog Data
CA230010EN

Effective September 2015
Supersedes 230-40 March 2000

COOPER POWER SERIES

Standard and OEM accessories



General

Eaton offers a variety of accessories to increase the reliability and availability of power capacitor installations with its Cooper Power™ series products. Opti-G™ fuse flippers come as standard equipment on substation bank assemblies and a line of Nature Guard™ wildlife protectors may be specified when required by special system needs. Also, these accessories can be supplied as OEM devices, allowing them to be specified as original equipment on assemblies not built by Eaton.

Opti-G fuse flippers

Years of research have gone into the development of Opti-G (Optimal Geometry) fuse flippers. Analysis of the flipper's motion and functional requirements has allowed for the optimization of their geometry and mechanical characteristics. The resulting design provides superior orchestration with the remainder of the expulsion fusing system. Benefits of the Opti-G flippers include:

- **Elimination of leader whipping:** This phenomena is manifested by the operation of multiple fuses when only one fuse was required to operate. Ranging from a nuisance to a major operating concern, leader whipping can cause banks to trip off line without the benefit of alarm relay operation. In some cases, leader whipping has been responsible for sympathetic capacitor unit failures, tank ruptures, arcing between buswork, and high overvoltage generation.
- **Improved low-current clearing:** The positive ejection of the operated fuse link allows rapid dielectric strength buildup within the fuse tube, ensuring proper clearing even under low-current/low-energy conditions.
- **Elimination of Permanent Deformation:** Some conventional flipper spring designs, after having been left in a cocked position for many years, may permanently take up this shape and lose their flipper action. This can result in disastrous fuse restriking and improper clearing of faulted capacitor units.

Opti-G flippers are available in a number of styles for various mounting configurations. Supplied as standard equipment with Eaton's substation banks, these advanced technology flippers are ideal for PCB replacement/retrofit applications. See Table 1 for available ratings and Figure 1 for mounting tolerances.

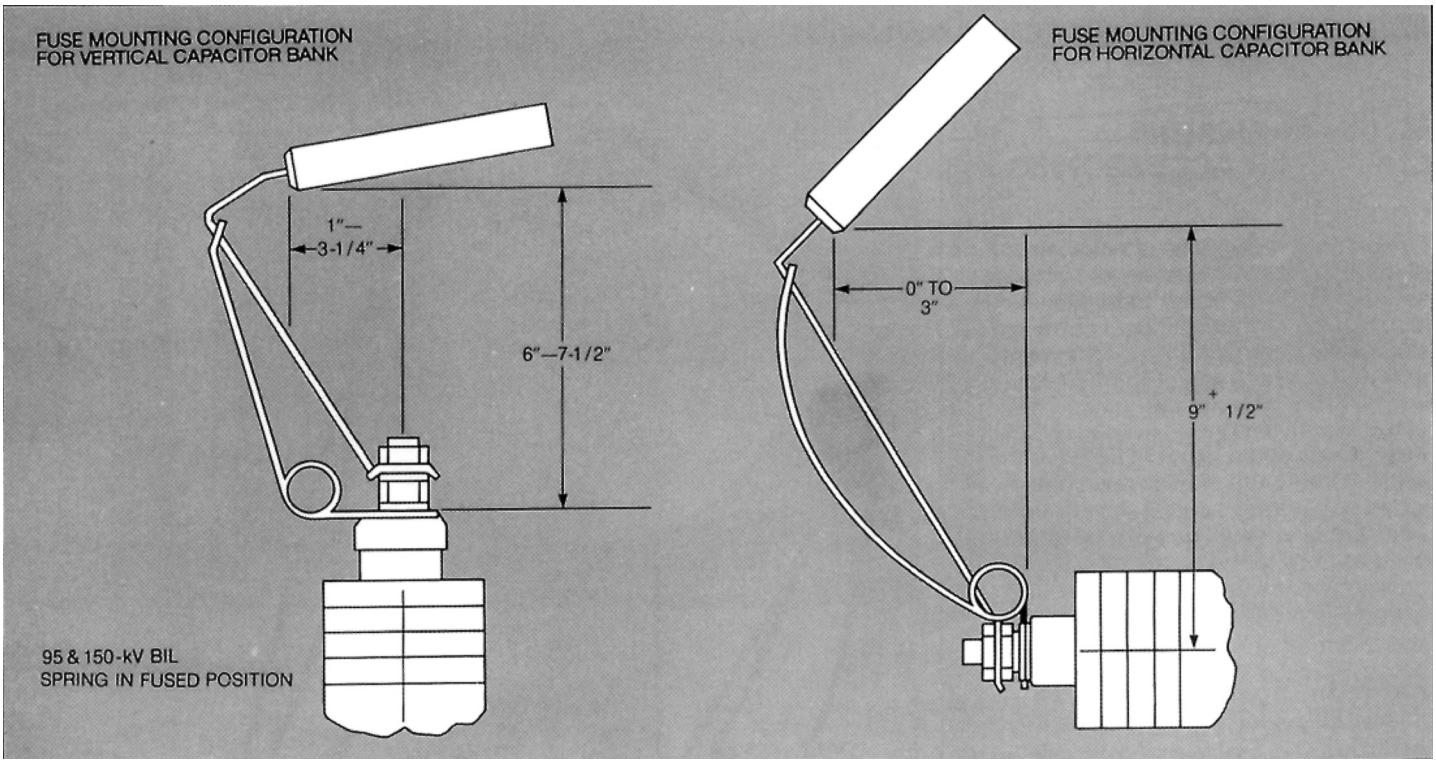


Figure 1. Opti-G flipper spring mounting configurations and dimensions for vertical and horizontal capacitor banks. For mounting dimensions other then those shown, contact your Eaton Representative.

Table 1. Opti-G Fuse Flipper

Capacitor Unit Orientation	Unit BIL	Flipper Style Catalog No.
Vertical	95	CCB140Y1
Vertical	125-150	CCB140Y2
Horizontal	95-150	CCB125Y1

Nature Guard wildlife protectors

Items in the Nature Guard line of wildlife protectors are designed to give your equipment the ultimate in protection against nuisance outages caused by aggressive or pesky members of the animal kingdom.

Nature Guard terminal covers

These heavy-duty terminal covers (Figures 2A and 28) are ideal for pole-mounted racks where squirrels or other aggressive animals have proven conventional terminal covers inadequate. They offer:

- **Screw-on assembly:** Cannot be pried off
- **Skirt hugging design:** Edges cannot be lifted off of the top bushing skirt. This prevents foreign matter from being deposited under the covers.
- **Bacterial resistant:** Bacterial growth, which turns conventional covers black over time, is eliminated
- **UV resistant:** Minimal degradation from prolonged exposure to ultraviolet (UV) radiation is assured
- **Heavy-duty:** The heavy-duty design and 15 kV withstand capability of the covers ensures long life

Figure 2A and 2B. Nature Guard CCM31A1 terminal cover showing its two-part construction (Figure 2A) and typical installation (Figure 2B). Note that the lid screws on the threaded bushing stud.

Table 2. Nature Guard Terminal Covers

Equipment	BIL	Cover Style Catalog No.
Light-Duty Terminal Cover*	75-200	CCM25A1
Capacitor Unit**	75-95	CCM31A1
Capacitor Unit***	125-200	CCM36A1
Type NR Switch	95	CCM32A1
Type NR Switch	125	CCM33A1
Joslyn VSV		CCM35A1
Type TSC Switch	125	CCM34A1

* This is a slip-on, not screw-on, terminal guard. See Figure 3.

** Or any bushing with 3-in. dia, skirts

*** Or any bushing with 3-5/16 in. dia. skirts.

Also available is a line of light-duty birdguard terminal caps (Figure 3). These are standard equipment on all Eaton pole racks and are ideal for installations with limited animal problems. Nature Guard terminal covers are available for a variety of equipment used in pole-mounted capacitor rack applications. See Table 2 for application information.

Nature Guard expulsion fuse plug

Expulsion fuse plugs fit snugly in the end of expulsion fuse tubes, preventing insects from nesting in the body of the tube. Some insects, such as mud dauber wasps, attach to the cavities provided by fuse tubes. Their dense mud nests can soon clog the expulsion tube, preventing the fuse leader from being ejected properly during fuse operation. The fuse plug prevents this nesting activity while allowing the fuse leader to pass out of the tube. Nature Guard fuse plugs have been specially designed not to interfere with proper fuse leader ejection. Refer to Table 3 for more information.

Table 3. Nature Guard Expulsion Fuse Tube Plug

Fuse Tube	Fuse Tube Inner Diameter	Plug Style Catalog No.
FN3Y2	3/8"	CCM120B1

Figure 3. Standard CCM25A1 slip-on birdguard.

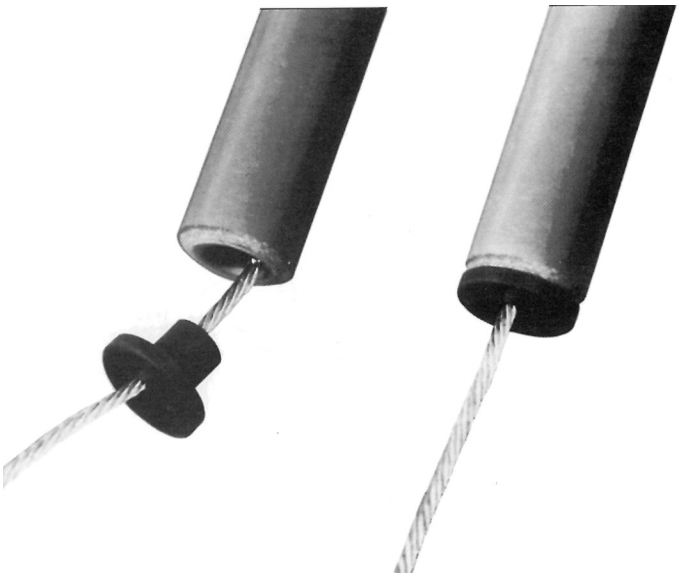


Figure 4A and 4B. Nature Guard expulsion fuse tube plug protects against insect nest building in fuse tubes. Figure 4A shows the plug threaded on the fuse leader and Figure 4B shows final installation.

Capacitor hanger frames

Eaton manufactures capacitor hangers for three or six capacitors. These hangers, made of galvanized steel, are shipped unassembled to allow for a smaller and more compact package. Note that these hangers are not recommended if switches are to be used with the capacitors. See Table 4 for ordering information and see *Catalog Data CA230001EN Capacitors - Pole-Mounted Racks with Single-Phase Units* for rack frames suitable for direct mounting of switches or other accessories.

Table 4. Capacitor Hangers: 15.62" Mounting Centers

Description	Catalog No.	Net Weight (lbs.)
Direct-pole-mounting hanger for 3 or 4 capacitors (Fig. 5)	CCH3P1	37
Crossarm-mounting hanger for 3 or 4 capacitors, same as CCH3P1 less plate (Fig. 5)	CCH4A1	34
Direct-pole-mounting hanger for 6 capacitors (Fig 6)	CCH1P6	37
Crossarm-mounting hanger for 6 capacitors, same as CCH1P6 less tie rods and back brace (Fig. 6)	CCH3A6	35

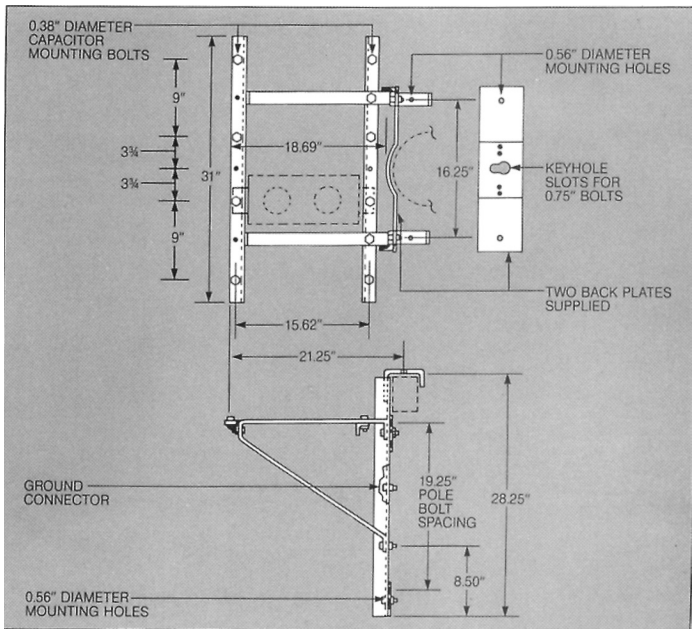


Figure 5. Direct-pole-mounting hanger for three or four capacitors: Catalog No. CCH3P1. Less backplates, crossarm-mounting hanger for three or four capacitors is identical: Catalog No. CCH4A1.

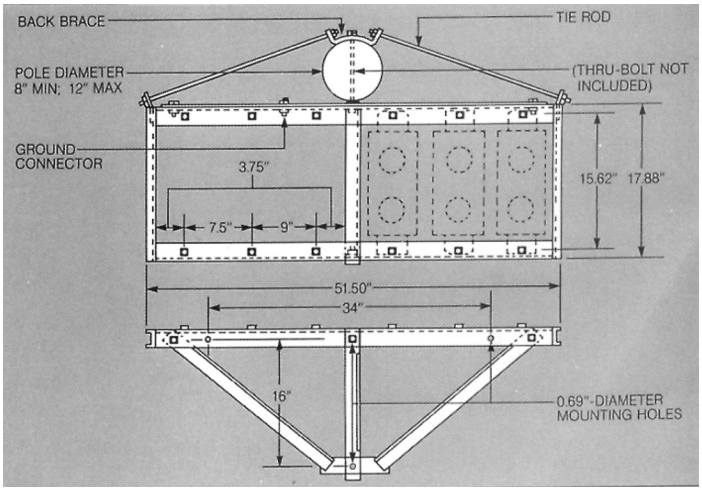


Figure 6. Direct-pole-mounting hanger for six capacitors: Catalog No. CCH1P6. Less tie rods and back brace, crossarm-mounting hanger for six capacitors is identical: Catalog No. CCH3A6.

Capacitor unit mounting spacers

These corrosion resistant aluminum spacers bolt on to the bottom of the capacitor unit hanger bracket, effectively increasing the "D" dimension shown in *Catalog Data CA230003EN Medium-Voltage, Standard-Duty, Heavy-Duty, and Extreme-Duty Single-Phase, Unfused Capacitor Units and Accessories*. Spacers are available from 2" to 6" (50.8 mm to 152.4 mm) in 1" (25.4 mm) increments. Spacers should be used whenever an installation requires a larger "D" dimension. This most commonly occurs when replacing old capacitors in individually fused substation banks with capacitor units having differing "D" dimensions. Maintaining this dimension is usually required to ensure proper fuse operation. See Table 5 for ordering information.

Table 5.

Spacer Height	Catalog No.
2 inches	CCP260X1
3 inches	CCP235X1
4 inches	CCP223X1
5 inches	CCP261X1
6 inches	CCP259X1

A quantity of 2 spacers are required per capacitor unit

Inrush current-limiting reactors

Inrush current-limiting reactors limit transient discharge currents during switching of parallel steps in closely spaced capacitor banks. The fully tested design assures proper protection for switching equipment. Inductance selected will limit inrush current to safe levels in most banks. The compact design of the CCM13B1 reactor (Figure 7) is particularly suited for use in pole-mounted and metal-enclosed banks.

Figure 7. Current-limiting reactor CCM13BI.

Figure 8. Current-limiting reactor CCM10BI.

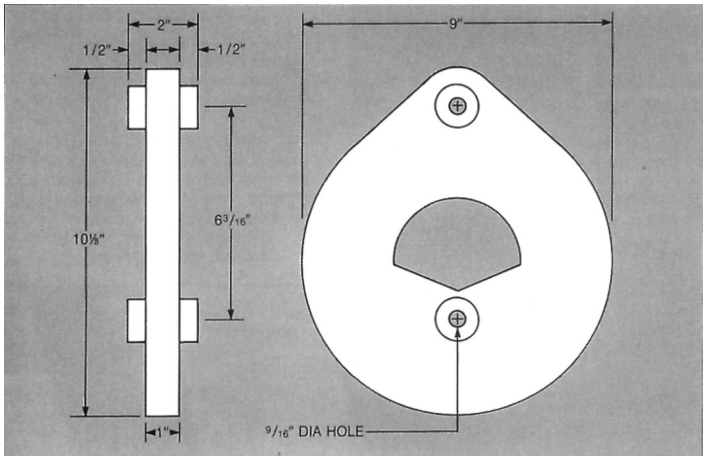


Table 6. Specifications for CCM13B1 Reactor

		Maximum Continuous Current Rating (amps)		High Frequency Rating	
Inductance** (µH)	No. Units in Parallel	60 Hertz*	1/2 Cycle 60 Hz rms asym	Max Inrush Current (ka)	Max Surge Voltage (kv)
40	1	135	9000	12	18
28	2	235	9000	12	18
21	3	300	12000	12	18

* When mounted vertically with 1-inch spacing between parallel units.

** When mounted vertically with 1-inch spacing and the same winding direction for parallel units.

Table 7. Ordering Information for CCM13B1 Reactors

Mounting Configuration	One Reactor Catalog Number	Two Parallel Reactor Catalog Number
Plain Reactor (no mountings)	CCM13B1	—
Reactor With Capacitor Bushing Mounting*	CCM53B3	CCM53B6
Reactor With Structural Channel Mounting	CCM64B1	CCM64B2
Reactor with 3" Bolt Circle Insulator Mounting	CCM52B1	CCM52B2
Reactor With NR Switch Terminal Mounting	CUM85036B1	—

* To be mounted on bushings of two adjacent capacitor units

Ordering information

For more information on the Standard and OEM Capacitor accessories, contact your Eaton representative.

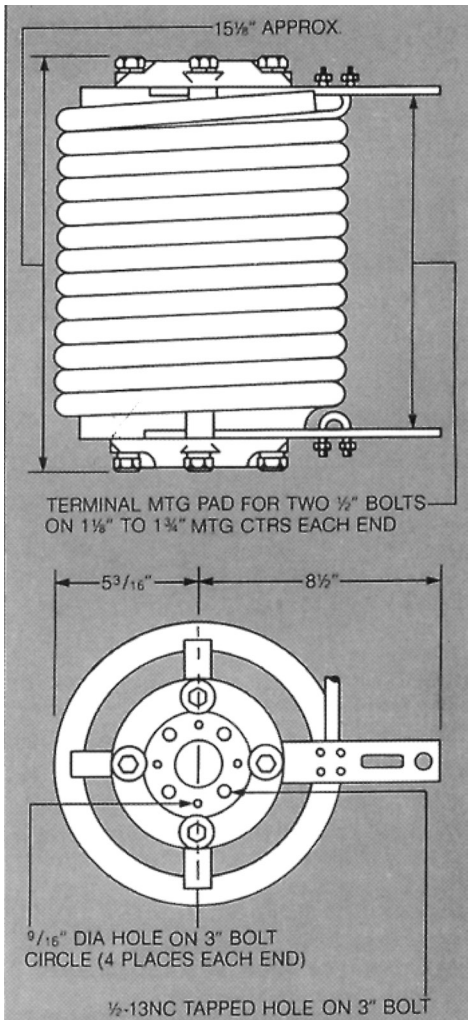


Table 8. Specifications for CCM10B1 Reactor

	Maximum Current Rating (amps)		High Frequency Rating	
Inductance (µH)	60 Hz rms	1/2 Cycle 60 Hz rms asym	Max Inrush Current (peak amps)	Max Surge Voltage (peak kv)
20	400	30,000	45,000	75

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